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Paleontological Reconnaissance Report

RTM's Proposed "Castle Peak Mining Project" (Sec. 2, T 9 S, R 17 E)

Pariette Draw SW
Topographic Quadrangle
Uintah & Duchesne Counties, Utah

October 9, 2007

Prepared by Stephen D. Sandau
Paleontologist for
Intermountain Paleo-Consulting
P. O. Box 1125
Vernal, Utah 84078

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INTRODUCTION

At the request of Russ Conn of GR Conn, on behalf of RTM Exploration and Holdings LLC. and authorized by James Kirkland of the Office of the State Paleontologist, a paleontological reconnaissance survey of RTM's proposed "Castle Peak Mining Project" (Sec. 2, T 9 S, R 17 E) was conducted by Stephen Sandau on October 2, 2007. The survey was conducted under Utah Paleontological Investigations Permit #07-356. This survey to collect any paleontological materials discovered during the construction processes in danger of damage or destruction was done to meet requirements of the National Environmental Policy Act of 1969, and other State and Federal laws and regulations that protect paleontological resources.

FEDERAL AND STATE REQUIREMENTS

As mandated by the State of Utah, paleontologically sensitive geologic formations on State lands that may be impacted due to ground disturbance require paleontological evaluation. This requirement complies with:

1) The National Environmental Policy Act of 1969 (NEPA) (42 U.S.C. 4321.et. Seq., P.L. 91-190);
2) The Federal Land Policy and Management Act (FLPMA) of 1976 (90 Stat. 2743, 43 U.S.C. § 1701-1785, et. Seq., P.L. 94-579).
3) The National Historic Preservation Act.16 U.S.C. § 470-1, P.L. 102-575 in conjunction with 42 U.S.C. § 5320; and
4) The Utah Geological Survey. S. C. A.: 63-73-1. (1-21) and U.C.A.: 53B-17-603.

Under policy dictated by the BLM Manual and Handbook H-8270-1 (July, 1998) formations are ranked according to their paleontological potential:

- *Condition 1* is applied to those areas known to contain fossil localities, and special consideration of the known resources is in need of evaluation.
- *Condition 2* is applied to areas that have exposures of geologic rock units known to have produced fossils elsewhere.
- *Condition 3* is applied to areas unlikely to produce fossils based on surficial geology.

Although these guidelines apply mostly to vertebrate fossils on BLM lands, they are equally designed to help protect rare plant and invertebrate fossils and will be used here for State lands as well. It should be noted that many fossils, though common and unimpressive in and of themselves, can be important paleo-environmental, depositional, and chronostratigraphic indicators.

LOCATION

RTM's proposed "Castle Peak Mining Project" (Sec.2, T 9 S, R 17 E) is located on lands managed by the State of Utah Trust Lands Administration (SITLA) in the Castle Peak Draw area, on Pariette Bench and some 18 miles south/southeast of the Myton, Utah. The project area can be found on the Pariette Draw SW 7.5 minute U. S. Geological Survey Quadrangle Map, Uintah & Duchesne Counties, Utah.

PREVIOUS WORK

The basins of western North America have long produced some of the richest fossil collections in the world. Early Cenozoic sediments are especially well represented throughout the western interior. Paleontologists started field work in Utah's Uinta Basin as early as 1870 (Betts, 1871; Marsh, 1871, 1875a, 1875b). The Uinta Basin is located in the northeastern corner of Utah and covers approximately 31,000 sq. km (12,000 sq. miles) ranging in elevation from 1,465 to 2,130 m (4,800 to 7,000 ft) (Marsell, 1964; Hamblin et al., 1987). Middle to late Eocene time marked a period of dramatic change in the climate, flora, (Stucky, 1992) and fauna (Black and Dawson, 1966) of North America.

GEOLOGICAL AND PALEONTOLOGICAL OVERVIEW

Early in the geologic history of Utah, some 1,000 to 600 Ma, an east-west trending basin developed creating accommodation for 25,000 feet of siliclastics. Uplift of that filled-basin during the early Cenozoic formed the Uinta Mountains (Rasmussen et al., 1999). With the rise of the Uinta Mountains the asymmetrical synclinal Uinta Basin is thought to have formed through the effects of down warping in connection with the uplift. Throughout the Paleozoic and Mesozoic deposition fluctuated between marine and non-marine environments laying down a thick succession of sediments in the area now occupied by the Uinta Basin. Portions of these beds crop out on the margins of the basin due to tectonic events occurring during the late Mesozoic.

Early Tertiary Uinta Basin sediments were deposited in alternating lacustrine and fluvial environments. Large shallow lakes periodically covered most of the basin and surrounding areas during early to mid Eocene time (Abbott, 1957). These lacustrine sediments show up in the western part of the basin, dipping 2-3 degrees to the northeast and are lost in the subsurface on the east side. The increase of cross-bedded, coarse-grained sandstone and conglomerates preserved in paleo-channels indicates a transition to a fluvial environment toward the end of the epoch.

Four Eocene formations are recognized in the Uinta Basin: the Wasatch, Green River, Uinta and Duchesne River, respectively (Wood, 1941). The Uinta Formation is subdivided into two lithostratigraphic units namely: the Wagonhound Member (Wood, 1934), formerly known as Uinta A and B (Osborn, 1895, 1929) and the Myton Member previously regarded as the Uinta C.

Within the Uinta Basin in northeast Utah, the Uinta Formation in the western part of the basin is composed primarily of lacustrine sediments inter-fingering with over-bank deposits of silt and mudstone and westward flowing channel sands and fluvial clays, muds and sands in the east (Bryant et al, 1990; Ryder et al, 1976). Stratigraphic work done by early geologists and paleontologists within the Uinta Formation focused on the definition of rock units and attempted to define a distinction between early and late Uintan faunas (Riggs, 1912; Peterson and Kay, 1931; Kay 1934). More recent work focused on magnetostratigraphy, radioscopic chronology and continental biostratigraphy (Flynn, 1986; Prothero, 1996). Well known for its fossiliferous nature and distinctive mammalian fauna of mid-Eocene Age, the Uinta Formation is the type formation for the Uintan Land Mammal Age (Wood et al, 1941).

The Duchesne River Formation of the Uinta Basin in northeastern Utah is composed of a succession of fluvial and flood plain deposits composed of mud, silt and sandstone. The source area for these late Eocene deposits is from the Uinta Mountains indicated by paleocurrent data (Anderson and Picard, 1972). In Peterson's (1931c) paper, the name "Duchesne Formation" was applied to the formation and it was later changed to the "Duchesne River Formation" by Kay (1934). The formation is divided up into four members: the Brennan Basin, Dry Gulch Creek, LaPoint and Starr Flat (Anderson and Picard, 1972). Debates concerning the Duchesne River Formation, as to whether its age was late Eocene or early Oligocene, have surfaced throughout the literature of the last century (Wood et al., 1941; Scott 1945). Recent paleo-magnetostratigraphic work (Prothero, 1996) shows that the Duchesne River Formation is late Eocene in time.

FIELD METHODS

In order to determine if the proposed project area contained any paleontological resources, a reconnaissance survey was performed. An on-site observation of the proposed areas undergoing surficial disturbance is necessary because judgments made from topographic maps alone are often unreliable. Areas of low relief have potential to be erosional surfaces with the possibility of bearing fossil materials rather than surfaces covered by unconsolidated sediment or soils.

When found within the proposed construction areas, outcrops and erosional surfaces were checked to determine if fossils were present and to assess needs. Careful effort is made during surveys to identify and evaluate significant fossil materials or fossil horizons when they are found. Microvertebrates, although rare, are occasionally found in anthills or upon erosional surfaces and are of particular importance.

PROJECT AREA

The project area is situated in the Wagonhound Member (Uinta A & B) of the Uinta Formation. The proposed project area is situated mainly in the SW/NE quarter-quarter section of Sec. 2, T 9 S, R 17 E (Figure 1). The area where the proposed mining operation is to take place is situated on an elevated area covered largely by irregular depths of eolian sand overlaying the target units containing the prospectable ore. The units where the ore deposits are preserved consist of a set of closely staked tan to light yellow, coarse-grained, cross-bedded fluvial sandstones. The units contain a number of small iron concretions (~2-10cm), lenses of organic material replaced with iron and layers rich with interstitial copper and other related minerals. Underneath the more resistant sandstone cap is a thick succession of paleosols; floodplain deposits composed of light green, red and maroon siltstones, mudstones and claystones. Regional deflation in between the preserved paleo sandstone channels has left an uneven drape of resistant iron rich concretions and sandstone clasts and slabs over the badland topography of the less resistant overbank deposits.

A number of vertebrae fossils were discovered around the edges of the ore rich deposits. Two or three stratigraphic layers underneath the sandstone caps produce copious amounts of vertebrate fossils (Figure 1). Among those fossils found in this area were over 30 fossil turtles (*Echmatemys sp.*), two occurrences the (*Apalone sp.*) turtle, a number of large poorly preserved, mammalian limb bones fragments (brontothere?, including fragments of the proximal and distal ends of a femur), a fragmented mammalian scapula, possible crocodilian fragments of a limb bone and scapula and three teeth (two whole) $M_{1\&2}$ and jaw fragments of *Protoreodon sp.*

In addition to all of the fossil vertebrates found many of the floodplain deposits have well preserved ichnofossils. The majority of the traces appear to belong to the group called *Planolites*, a burrow made by mud-loving beetles. The abundance of these traces and the amount of paleo sediments that have been bioturbated indicates an environment which was stable for long periods of time allowing prolonged invertebrate habitation. In addition to these, a small piece of permineralized fossil wood was also found. The area where the fossils were found is designated as the new vertebrate fossil locality "42Un2279V."

SURVEY RESULTS

PROJECT	GEOLOGY	PALEONTOLOGY
"Castle Peak Mining Project" (Sec. 2, T 9 S, R 17 E)	The area where the proposed mining operation is to take place is situated on an elevated area covered largely by irregular depths of eolian sand overlaying the target units containing the prospectable ore. The units where the ore deposits are preserved consist of a set of closely staked tan to light yellow, coarse-grained, cross-bedded fluvial sandstones. The units contain a number of small iron concretions (~2-10cm), lenses of organic material replaced with iron and layers rich with interstitial copper and other related minerals. Underneath the more resistant sandstone cap is a thick succession of paleosols; floodplain deposits composed of light green, red and maroon siltstones, mudstones and claystones. Regional deflation in-between the preserved paleo sandstone channels has left an uneven drape of resistant iron rich concretions and sandstone clasts and slabs over the badland topography of the less resistant overbank deposits.	Condition 2 on top of the elevated areas where direct mining will occur. **A number of vertebrae fossils were discovered around the edges of the ore rich deposits. Two or three stratigraphic layers underneath the sandstone caps produce copious amounts of vertebrate fossils (Figure 1). Among those fossils found in this area were over 30 fossil turtles (*Echmatemys sp.*), two occurrences the (*Apalone sp.*) turtle, a number of large poorly preserved, mammalian limb bones fragments (brontothere?, including fragments of the proximal and distal ends of a femur), a fragmented mammalian scapula, possible crocodilian fragments of a limb bone and scapula and three teeth (two whole) $M_{1\&2}$ and jaw fragments of *Protoreodon sp.*** **In addition to all of the fossil vertebrates found many of the floodplain deposits have well preserved ichnofossils. The majority of the traces appear to belong to the group called *Planolites*, a burrow made by mud-loving beetles. The abundance of these traces and the amount of paleo sediments that have been bioturbated indicates an environment which was stable for long periods of time allowing prolonged invertebrate habitation. In addition to these a small piece of permineralized fossil wood was also found. The area where the fossils were found is designated as the new vertebrate fossil locality "42Un2279V."** **Condition 1 around the edges of the elevated areas where fossils materials were found weathering out of the variegated floodplain deposits.**

RECOMMENDATIONS

A reconnaissance survey was conducted for RTM's proposed "Castle Peak Mining Project" (Sec. 2, T 9 S, R 17 E). The proposed mining area covered in this report showed signs of vertebrate fossils; therefore, we advice the following recommendations.

We recommend that no paleontological restrictions should be placed on the mining operation which will be contained to the area outline in (Figure 1) by the solid blue line down to the bottom of the or bearing layers. If mining operations continue down through the fossiliferous, variegated floodplain deposits of siltstones, mudstones and claystones, we recommend that a permitted paleontologist perform a spot check monitor on the mining process.

We further recommend that a permitted paleontologist be present to monitor the surface disturbance during the reclamation process of colluvial ore deposits eroded off the elevated areas onto the surrounding slopes inside of the newly designated vertebrate fossil area "42Un2279V." The remaining slope areas outside of the vertebrate fossil locality "42Un2279V", although not as superficially fossiliferous, nevertheless contain great potential for bearing fossil vertebrates at shallow depths and it is recommended for these areas a permitted paleontologist perform a spot check monitor during the reclamation process.

Nevertheless, if any vertebrate fossil(s) are found during construction within any the project area, Operator (Lease Holder) will report all occurrences of paleontological resources discovered to a geologist with the Office of the State Paleontologist. The operator is responsible for informing all persons in the areas who are associated with this project of the requirements for protecting paleontological resources. Paleontological resources found on the public lands are recognized by the State as constituting a fragile and nonrenewable scientific record of the history of life on earth, and so represent an important and critical component of America's natural heritage.

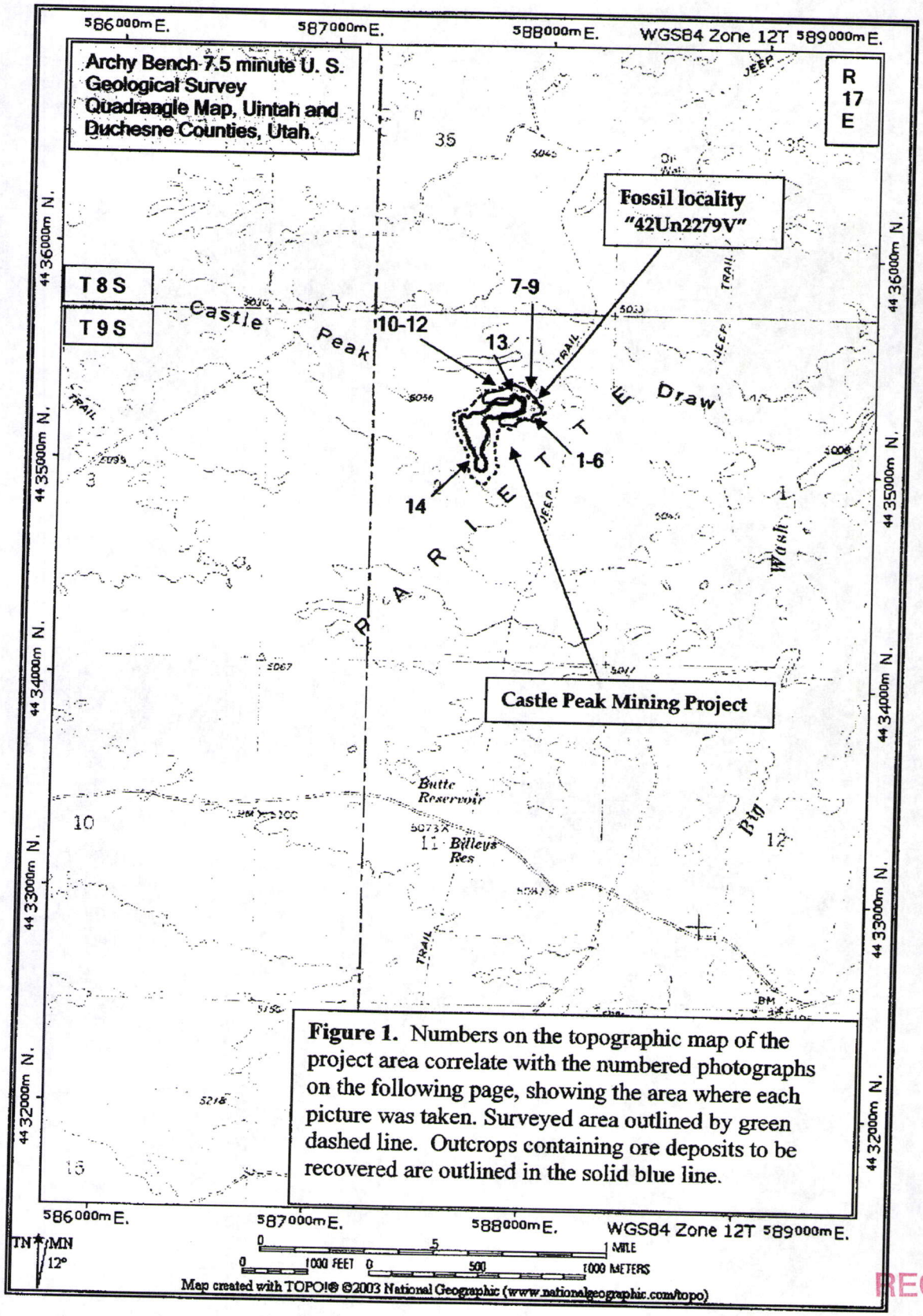


Figure 1. Numbers on the topographic map of the project area correlate with the numbered photographs on the following page, showing the area where each picture was taken. Surveyed area outlined by green dashed line. Outcrops containing ore deposits to be recovered are outlined in the solid blue line.

Figure 1. *continued...*

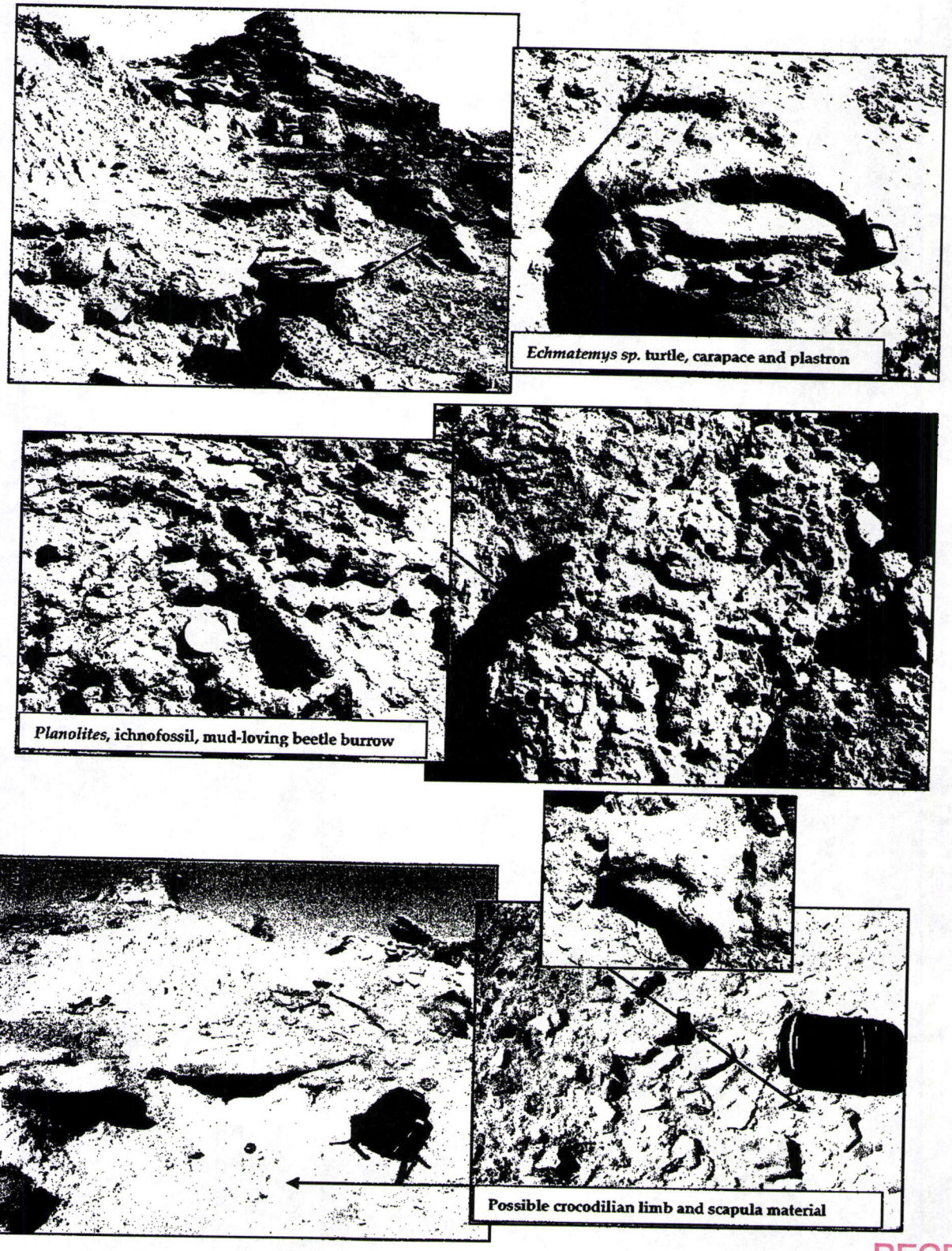
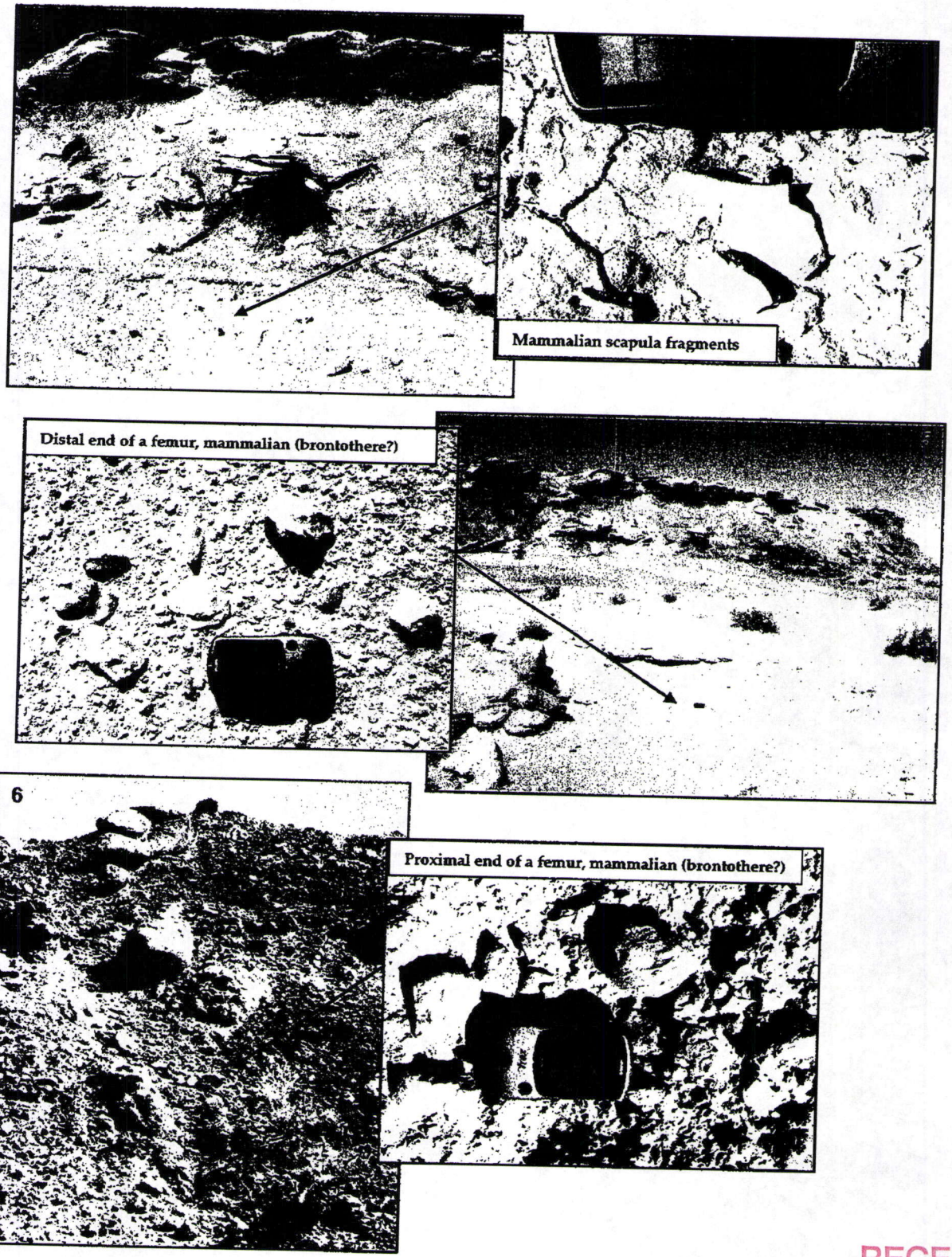


Figure 1. *continued...*



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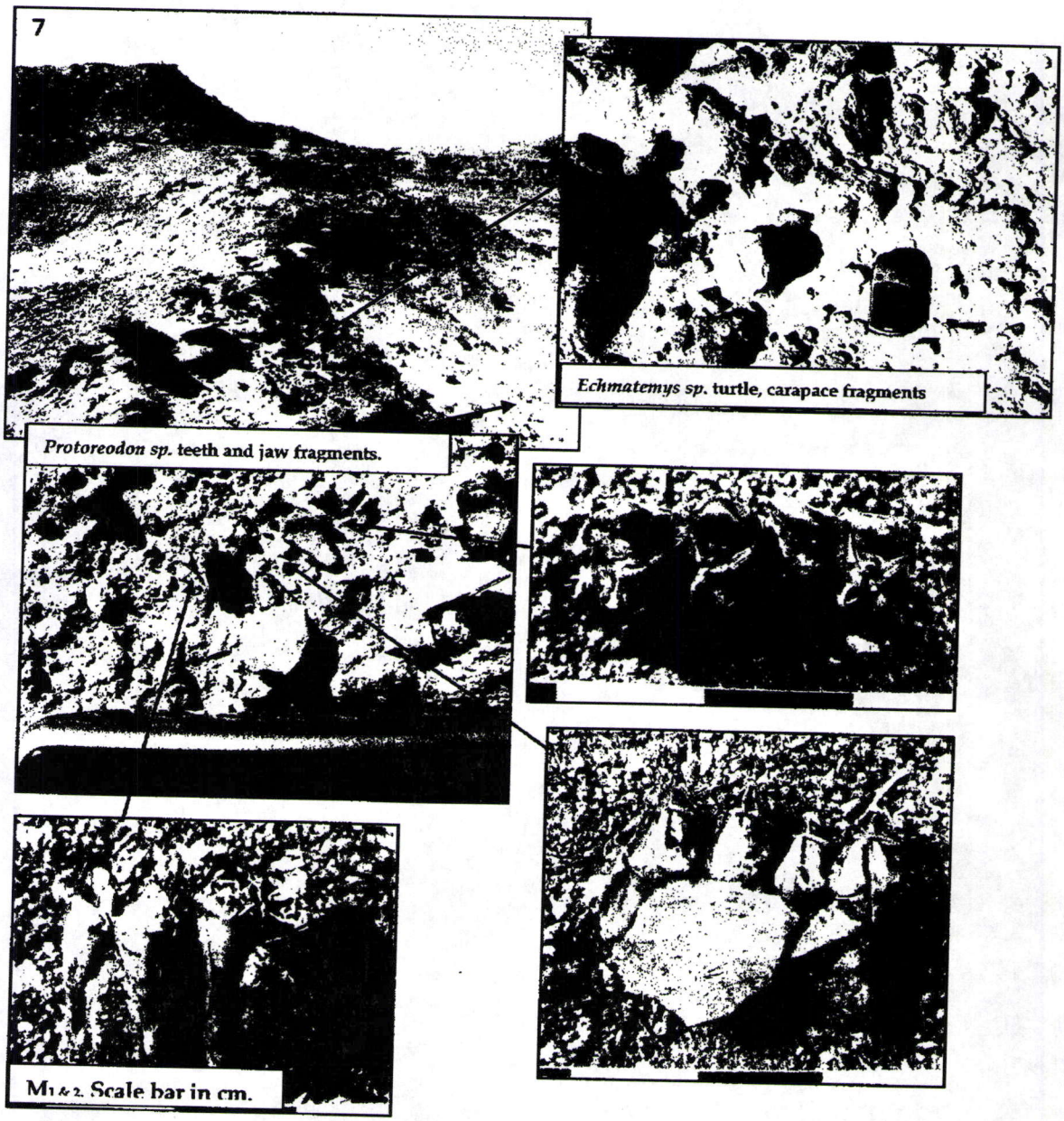

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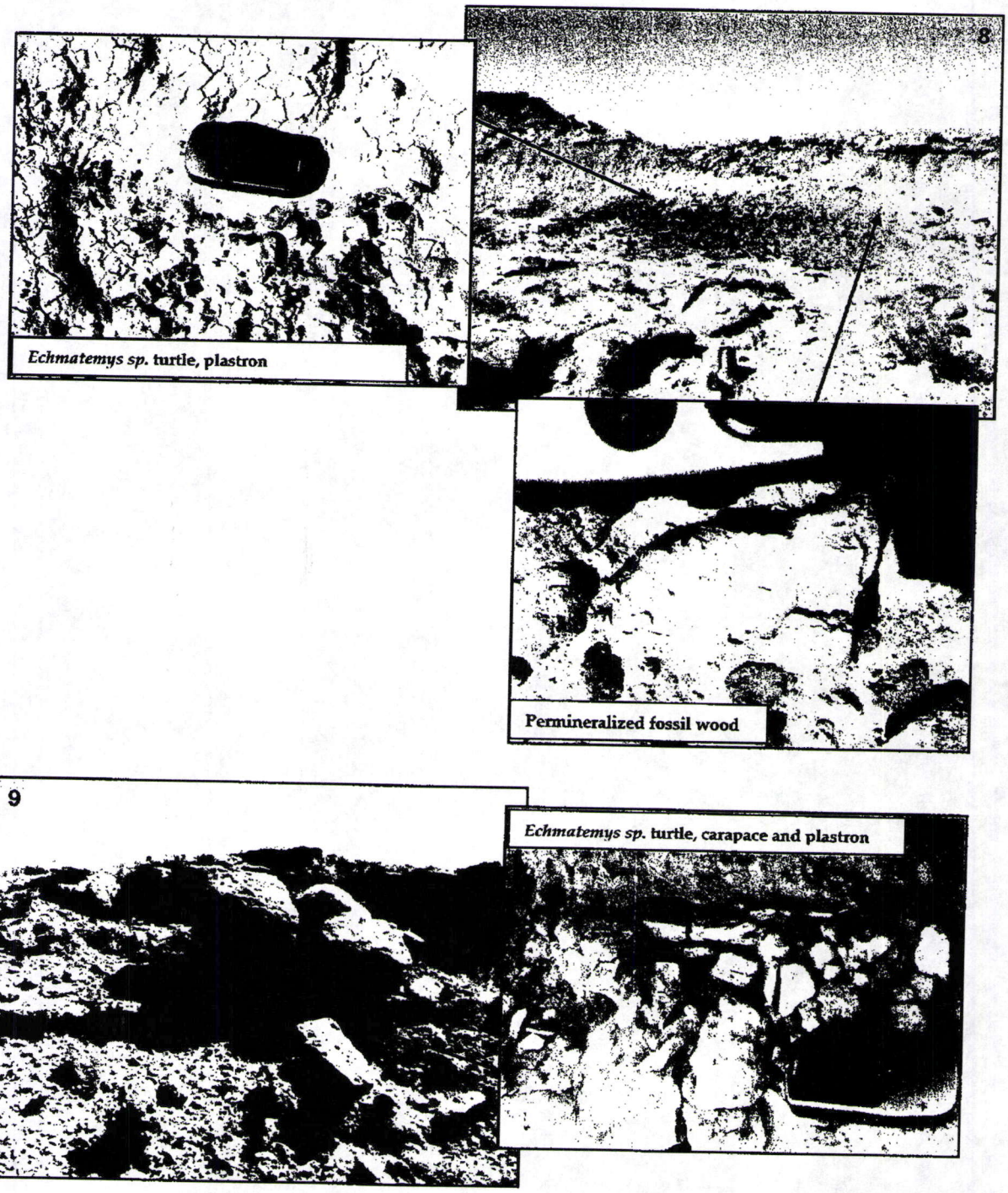

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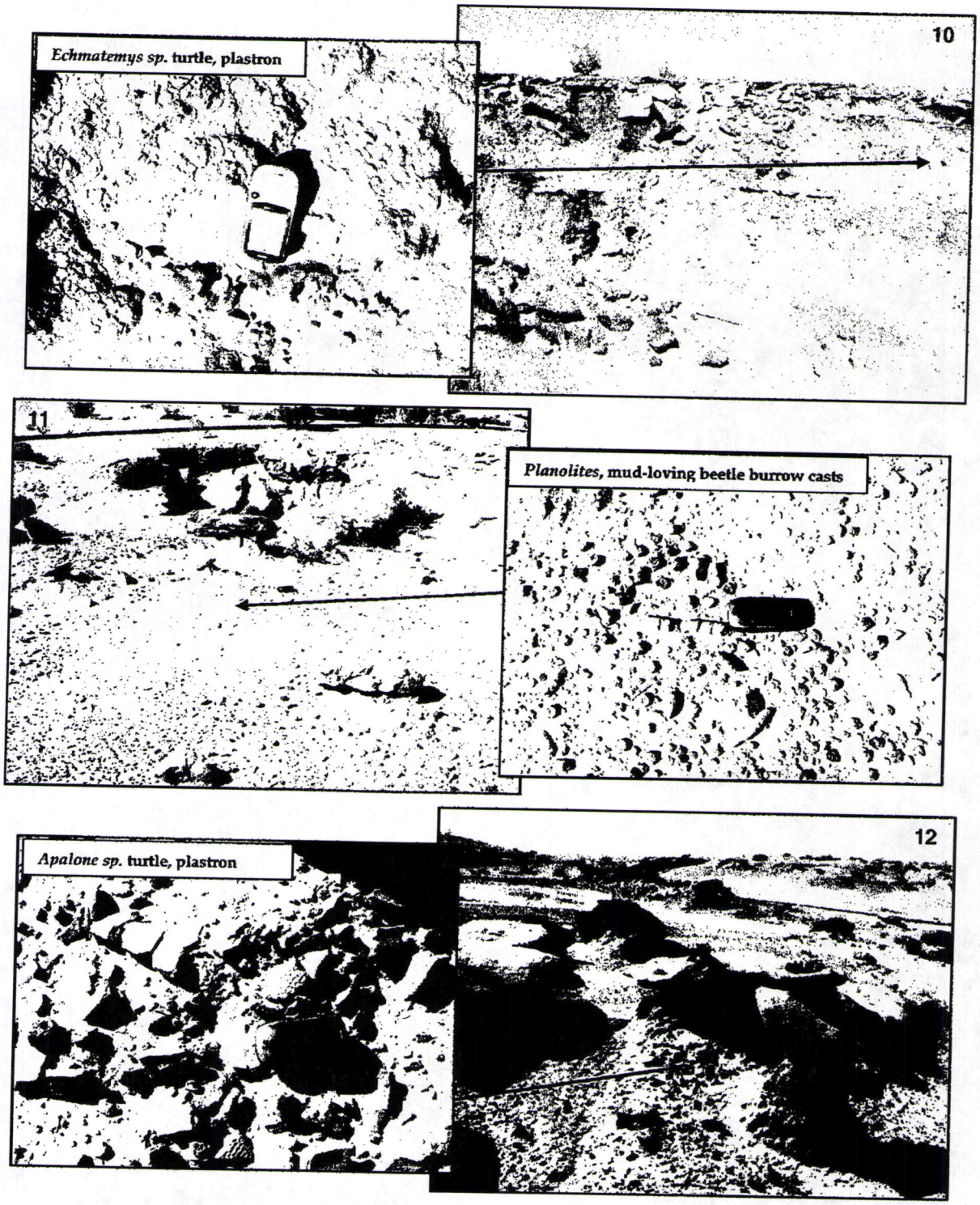
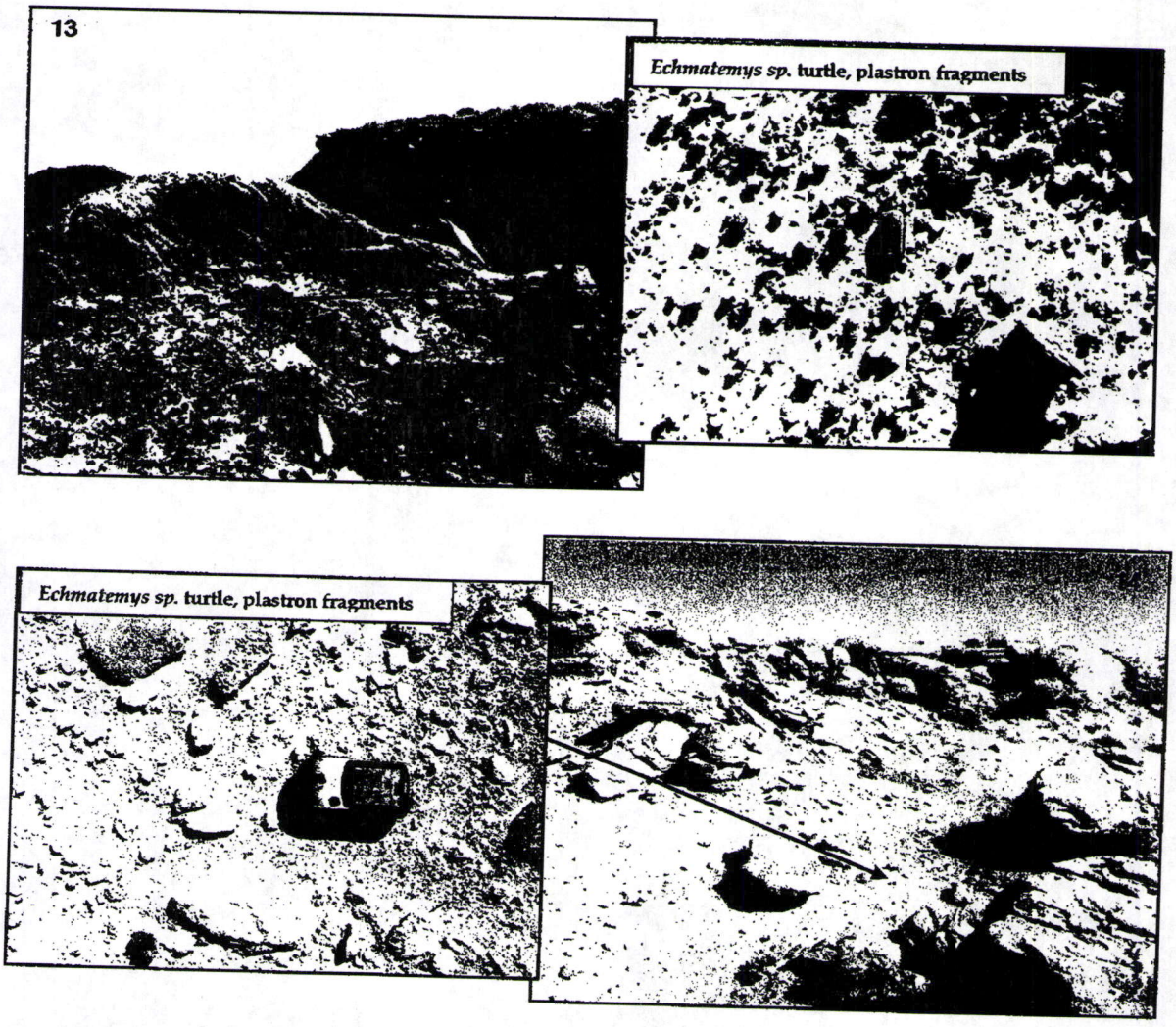


Figure 1. *continued...*



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